ANDHRA PRADESH

RECRUITMENT OF ASSISTANT PROFESSORS IN THE UNIVERSITY
SYLLABUS FOR THE SCREENING TEST

BOTANY
SUBJECT CODE - 7

Unit: I

Microbiology: Virus-types, structure, purification, Replication transmission, economic importance, principles of immunity, antigen and antibodies interaction; Bacteria- diversity structure, nutrition, reproduction, biological importance, Cyanobacteria, thallus diversity reproduction and economic importance and as elicitors; Fungi-classification, Eumycota, Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina, and Dueteromycotina, nutrition, reproduction, heterothallism and economic importance, Mychorrhizae Types, importance in growth and development; Lichens – types and ecological importance.

Unit: II

Phycology- classification of algae, diversity of habitats (Terrestrial, Fresh & Marine water and in association) thallus evolution, pigments, reserve food and reproduction, economic importance, lifecycles of Chlorophyceae, Xanthophyceae, Bacillariophyceae, Phaeophyceae, Rhodophyceae; Bryophytes- structure of thallus, and reproduction, evolution of sporophyte in Marchantiales, Jungermanniales, Polytrychales, economic and ecological importance; Pteridophytes- classification, morphology, anatomy reproduction, evolution of stele, strobilus and sorus, heterospory, origin of seed habit, apogamy, apospory and ecological importance; Gymnosperms- classification, evolution, distribution, structure and reproduction of Cycadales, Ginkgoales, Coniferales, Ephedrales, Welwitschiales and Gnetales.

Unit : III

Origin and phylogeny of Angiosperms- age, place, and theories of origin and evolutionary lines of Monocots and Dicots; salient features of ICBN & ICN; Taxonomy of Angiosperms and systematics, phonetic versus phylogenetic systems of classifications: Bentham and Hooker, Engler and Prantle, Bessy, Hutchinson, Cronquist, Thorne, Dahlgren & APG; merits and demerits. Taxonomic hierarchy, Evolution- origin of life, Darwin's theories, plant identification and speciation; Taxonomic Evidences and Morphology, Anatomy, Playnology, Embryology, Cytology, Phytochemistry, Nucleic acid hybridization, Serological, Numerical taxonomy, important herbaria of India and world, Herbarium methodology; Botanical gardens- importance and characters; Indian and world botanical gardens; floras, manuals monographs and revisions.

Unit: IV

Plant development- Tissue types, tissue systems in plants, growth and development of root, shoot, leaf and flower, apical meristem, regeneration and differentiation of xylem and phloem, secondary growth and anomalous secondary growth; Embryology- male and female gametophytes, microsporogenesis and megasporogenesis, types of embryo sacs and haustoria, pollination mechanisms, self-incompatibility, fertilization, types of embryogenesis, fruit growth and seed development; Ecology- concept of ecosystem, food chain, food webs, ecological succession, community development, organization and stratification, ecological niches and pyramids, association and interaction among intra and inter specific, ecosystem dynamics, biogeochemical cycles, (Water, Carbon, Nitrogen, Phosphorus and Oxygen) ecosystem energetics and budget; and energy flow.

UNIT: V

Plant biochemistry – enzyme mechanism and mode of action, regulators, active sites and isozymes, reactions of carbohydrates, amino acids; synthesis, structural organization, denaturation and renaturation of proteins. Plant respiration, significance of photorespiration; structure and function of lipids, synthesis and catabolism of lipids; Nitrogen fixation, ammonia and sulphate assimilation; Plant Physiology- SPAC concept, stomatal movement, membrane, phloem and xylem transport, Photosynthesis- light harvesting complexes, photo oxidation of water, oxygen evolving complex, ATPase, Photophosphorylation, RUBISCO activation and carbon assimilation, mechanism of C4 & CAM pathways. Stress Physiology- plant molecular responses and tolerance mechanisms of abiotic and biotic stress, role of LEA proteins, Heat Shock Proteins and miRNA in stress response, senescence, photoperiodism, vernalization; signal transduction pathways, gene expression, physiological effects and mechanism of action of plant growth regulators.

Unit: VI

Phytogeography- theories and phytogeographical regions in India, continental drift, Plate tectonics of world and India, endemism, Hotspots of India, species rarity and extinction, forest types of India and world; Environmental hazards and management; Physical and chemical characters of soil, greenhouse gases, global warming; air, water, soil, sound, radiation, heavy metal and atomic pollution on plants. Waste management and bioenergy, importance of biodiversity conservation, types and distribution; and causes for loss of biodiversity. Megadiversity and Agrodiversity centres, Remote Sensing-principles and applications in analysis of biodiversity; *in situ* and *ex situ* conservation, role of IUCN, BSI, WWF, IPGN, NBPGR, ICAR, CSIR, DBT, DST, NGO'S and indigenous people in conservation, Mangroves, Sacred groves, Biodiversity act.

Unit: VII

Cytology- structural organization of plant cell, ultra structure and functions of cell wall, plasma membrane, cellular organelles, chromosomes and mitotic and meiotic divisions. Techniques in cell biology-visible and UV mass spectroscopy, optical, scanning and transmission electron microscopes, differential and density gradient centrifugations, types of chromatography; Molecular Genetics-molecular basis of gene mutations, Mendelian principles, gene mapping, genome sequencing, *in silico* methods for gene identification. Functional genomics, TILLING, SAGE, MPSS. Proteomics- protein

separation techniques, 2D analysis, MLC, molecular clocks, construction of molecular phylogenetic trees. Applications of plant genomics in agriculture and industry.

UNIT: VIII

Plant-Biotechnology- regeneration, totipotency, morphogenesis, organogenesis and somatic embryogenesis; types of tissue culture media, somaclonal variations, somatic hybridization, protoplast/cell/organ culture. Significance of haploids and its production, role of growth regulators and factors govern in micropropagation, conservation of germplasm, synthetic seeds, gene cloning and analysis, gene isolation, genomic and c-DNA libraries, construction, production and application of transgenic plants, genetically modified crops, plant breeding, methods of breeding, selection of self and cross pollinated plants, inbreeding and heterosis, organic farming, types of compost and preparation, conventional farming, bio-fertilizers, mushroom cultivation, types of gardens and nurseries, plant nutrition and management, plant propagation, floral culture, Hydroponics; Plant Pathology, symptoms, diagnosis, epidemiology of plant diseases and management, viral, bacterial and fungal diseases of plants.

UNIT: IX

Ethno botany- Tribals of Andhra Pradesh and their traditional usage of plants in medicine, food and other purposes, Phytomedicine- systems of medicine, adulteration and alternations of drugs, medicinally useful plant parts, Pharmacology and pharmacognosy, formulations and dosage of plant drugs, biologically active constituents of medicinal plants, quality, purity and pharmaceutical uses , herbal medicines, cosmetics and dietetics; collection, processing and marketing of medicinal plants, GAAT & TRIP, Intellectual Patent Rights; Plant Resources Utilization- Origin and development of agriculture and food crops, Cereals, major and minor millets, pulse crops, oil seeds, fruits and vegetables, Non Wood Forest Products (NWFP), rubber, latex, gums, resins, bio-dyes, tannins, fibres, Bio-vitamins, commercial crops- spices and condiments, aromatic plants, flavouring products, beverages, fumigators, and masticatories; Narcotics, Apiculture, Silviculture, timber yielding plants, conventional and non-conventional energy resources. Generation of raw materials for paper industry.

UNIT: X

Nano-Technology- types of nano-devices and physical, chemical and biological synthesis; and characterization of biologically synthesized metal nanoparticles, tools and techniques used in identification of nano-devices SEM, EDAX, TEM, AFM, FTIR, & MNR; Role of nanotechnology in biomaterial sciences, micro-nano fabrication, nanomaterial in food processing and health; nanomedicines, nanotechnology in agriculture- nano-biofertilizers, nano-pesticides, nano-bio-insecticides, plant nano-boosters in seed dormancy, germination, growth and development; Paleobotany, Types and formation of fossils, fossils of Algae, Bryophytes, Pteridophytes and Gymnosperms. Computer applications, and bio-systematics, types of operating systems, applications of biosystematics, Databases (PDB, OMIM, EMBL) and data banks(Pubmed, Medline) sequence alignment- BLAST, FASTA, Phylogenetic analysis, types of biological data bases, (sequence and structural databases).